**CALIFORNIA STATE DEPARTMENT OF PUBLIC HEALTH**
GILES S. PORTER, M.D., Director

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# *On the Value of Self-Restraint in the Interpretation of Published Maternal Mortality Statistics*

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The prevention of maternal deaths and the saving of infant lives are public health activities which have a deep appeal in spite of the fact that we are sometimes judged as being a callous, material nation. This deeply-rooted interest in the betterment of conditions relative to child-bearing has created a desire to determine how many deaths are occurring in proportion to the risk involved and how these deaths may be prevented. If certain cities are showing a reduction in maternal mortality over a period of years, what is causing the reduction? Is it because of well-organized health service? Are many pregnancies hospitalized? Are there few or many midwives practicing? The answers to these questions are popularly assumed to lie in the association of maternal mortality with the presence or absence of the above factors. Just what do we mean by maternal mortality? Many conclusions which are propounded are more apparent than real. It is with this in mind that the following difficulties of interpretation are presented.

Maternal mortality may be analyzed in a number of ways; *i.e.*, the number of maternal deaths may be expressed in proportion to the total population, in proportion to the total number of women of child-bearing age, or married women of child-bearing age; in proportion to the number of live births registered, or the number of live and stillbirths together. The first method, the number of maternal deaths in each 100,000 population, is bristling with difficulties, since not every one in the population is exposed to the risk of dying from a puerperal cause: there are men, women, and children represented in the usual population. One would never think of saying that there are twenty blond children among one hundred children and fifty kittens. How then, may such a rate be even considered, much less used for comparative analysis? If the population is limited to the number of women of child-bearing age, the conditions of actual risk are more nearly approached but the fact still remains that not all women of child-bearing age bear children. If the number of deaths from puerperal causes are ratioed to the number of married women of child-bearing age (discounting illegitimacy), the base population must be corrected for those women who are widowed or divorced.

The *real* maternal mortality rate would be obtained if it were possible to divide the number of maternal deaths by the *total* number of births, since every separation of an embryo, alive or dead, from the mother implies a chance of death. In practice, however, this is impossible. The best approximation is the maternal risk rate, which is obtained by dividing the maternal deaths by the total still and live births as defined by the laws of the particular State whose rate is being computed. The regulations which have to do with the registration of stillbirths in various states of the United States vary enormously.

A foetus is considered stillborn and registrable in 18 states after 4 months; in 2 states after 4½ months;

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Given before the Conference on a Plan for Maternity Care, Berkeley, July 21, 1932.

3 states after 5 months; 3 states after 6 months; 2 states after 28 weeks; 3 states after 7 months; 2 states have no definite rule; 1 state, any product of gestation that can be recognized must be registered.

In France many stillborn children are registered as alive because parents are unwilling to forego the rites of baptism. In Spain, any child born dead, or dying within twenty-four hours, is considered stillborn. In England and Wales, prior to 1927, live births only were registrable.

Since stillbirths are not uniformly defined and are poorly registered, it is customary to calculate the rate using live births only as a divisor. It is at once apparent that this overweights the maternal mortality rate since there are many deaths for which there are no corresponding live births.

Up to this point, we have assumed that the term "maternal death" has been accurately defined. What is meant by "maternal death"? Are deaths which occur before the fourth, fifth, sixth or seventh month of gestation considered as related to the puerperal state? What about a death occurring after one month postpartum? Are those deaths included which are complicated by some other infection such as smallpox, diphtheria, or tuberculosis, or cancer? The latter causes are usually given preference over those of the puerperal state according to the International List of Joint Causes of Death. This list is used by the Bureau of the Census in the determination of primary causes which are tabulated in the published mortality statistics. In a study, made by Doctor Susan McCoffin and her associates, of the maternal mortality in Massachusetts, it was found that out of 984 deaths judged by the investigators from information obtained from the attending physician and the hospital, as being from puerperal causes 10 per cent deviated from the primary cause given in the death certificate.

It becomes apparent that a definite statement of just what constitutes a maternal death is difficult to make. Many causes as stated on certificates are judgments made by the physician at the time of the death of the patient, sometimes influenced by regulation, and almost always by common local practice.

In some European countries, any other cause would be given the preference over causes arising from the puerperal state. In observing practices in southern Italy, I was surprised to discover that mothers, postpartum three weeks, who were suffering from puerperal sepsis, were considered to be ill with an infection unrelated to pregnancy. Not only is it impossible to obtain that portion of a population which represents only those persons liable to the risk of dying from puerperal causes, but it is also impossible to standardize what may be called a maternal death.

How then may we compare the maternal mortality rates of one city with another or one State with another State? If this is impossible, how absurd it is to compare the rates of various countries and draw conclusions from such comparisons. A great deal has been written concerning the unenviable position of the United States in regard to its maternal mortality rate as compared with other countries. It has been pointed out that our country ranks nineteenth among twenty countries which offer data. Before becoming too discouraged over our apparent position in the procession, let us examine the other marchers.

We have already seen that in France, stillbirths may be included among live births, increasing the divisor of the maternal mortality rate as calculated on the basis of live births; in Italy, what would be considered maternal deaths in the United States might not be included in this category. Both practices would tend to lower the European maternal mortality rates. Another circumstance which tends to reduce the calculated maternal mortality in Europe, is the fact that these countries are still military minded. Each government makes a point of being informed of the occurrence of every birth because of compulsory military training. It is well known that birth registration in the United States, although considered to be at least 90 per cent, is actually far from it in some cases. Even if registration of births were 90 per cent, the difference between registration in European countries and America would result in a 10 per cent loss in births for the United States, thus causing a fictitiously high maternal mortality rate in comparison with those of other nations. In conclusion, before the effectiveness of any preventive measure, or service at the time of delivery can be evaluated, much less measured, in terms of the reduction of total maternal mortality, general agreement must be reached in regard to the definition of terms. At the present time this necessity is neither fully recognized nor comprehended.

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Cholera was more prevalent during the calendar year 1930 than it was during 1929, although in 1930 it was not reported outside of Asia and the adjacent islands. Cholera did not appear in the continental United States, but an outbreak began in the Philippine Islands in May, 1930, and continued throughout the fiscal year. Cholera appears every year in parts of Asia and, under present conditions, outbreaks in the Philippine Islands may be expected, but the number of cases and deaths are much smaller than they were a few decades ago.—*Surgeon General H. S. Cumming, United States Public Health Service.*

## OILING MOSQUITO-BREEDING MARSHES BY AIRPLANE

By Harold Farnsworth Gray, Engineer for the District

A demonstration of oiling by airplane was made on Thursday, June 23, 1932, on the Plummer marsh south of Newark. The plane was a specially equipped biplane furnished by Independent Crop Dusting, Inc., which they had developed for the application of liquid sprays for crop pests.

As originally designed, the liquids were put out of the plane by four rotating brushes located at the rear edge of the lower wing, two on either side of the fuselage. The brushes were rotated by a shaft driven by a small propeller at the front edge of the wing, on which shaft was keyed a small pump. The supply tank, located in the fuselage just ahead of the pilot's seat, was fed to each pump and rotating brush by one-inch tubing.

The circular brush was made of steel wires approximately 10,000 wires of 32 gauge, the entire brush having an inner diameter of three inches, and an outer diameter of ten inches. The rate of rotation was approximately 5000 revolutions per minute.

The rotating brushes took the oil or other liquid fed at the center and threw it off at the periphery in a finely divided state, which the back-wash from the propeller, and from the plane's forward movement, tended to throw backwards and downwards. Quantities as low as two or three gallons per acre can be put out in very finely divided form.

On the afternoon of June 22d some preliminary experiments were made with this equipment, using a light oil of approximately kerosene grade which had been left over in the plane from some previous work. On the first flight it was very evident that the brushes were breaking the oil much too fine, and putting out too little oil for our purposes. The brushes were therefore removed and better application obtained.

Beginning at 5 a.m., on the morning of the 23d, the application of oil was tried on breeding marsh, under favorable weather conditions of calm, clear air. The pilot was provided with an aerial photographic map of the region, on which were designated the areas to be oiled.

The oil used was a 24-degree Diesel oil. The results indicated that it was just a little too heavy for the purpose, as it seemed to tend to coalesce in globules on the surface of the water; at midday in hot weather this tendency would probably not be so noticeable. For future work, an oil of from 27 to 30 degrees gravity would probably be better. Oils lighter than 30 degrees, however, would probably be lost in part in the air, before striking the ground, due to evaporation of the more volatile portions while in the finely divided state.

The effectiveness of the oil may be further increased, if desired, by the addition of 1 per cent or 2 per cent of a high temperature distillation cresylic acid. Where much wind prevails, this may be necessary, to get a quick kill before the oil is blown to the leeward side of the ponds.

Excluding the fifty gallons used in preliminary studies on Wednesday afternoon, 302 gallons were applied to an area of approximately 19 acres, or at a rate of about 16 gallons per acre. On account of drift, the oil probably covered a greater area than stated, and on account of probable losses due to the oil being rather too finely divided, it is doubtful if 16 gallons of effective oil per acre of surface was applied. From the appearance of the ponds, it looked as if the rate of application was more nearly 10 gallons per acre.

Examination made the following day (Friday, June 24th), showed that practically 100 per cent kill of mosquito larvae (Aedes dorsalis) had been obtained in the area oiled. There were no pupae at the time of oiling. Furthermore, there was a substantial diminution in the numbers of adult mosquitos which had hatched about two weeks previously in this area.

It had been intended to apply about 700 gallons of oil during this test, but after about 300 gallons had been applied, difficulty was had with one of the oil pumps, due to the excessive speed of rotation after the wire brushes were removed. As it would have taken some hours to make the repairs, by which time the wind would probably have become too strong for successful application, the test was discontinued.

The results of this test indicate that oiling of marshes by airplane for destruction of mosquito larvae is practicable, but certain mechanical difficulties are still to be overcome.

To improve the output of oil, it is suggested that the rotor of the pumps be changed so as to take the general form of the blades of a downward and outward flow turbine, and that the pitch of the small propeller blades be changed so as to materially reduce the speed of rotation. It will probably be necessary to obtain the advice of someone skilled in centrifugal pump design to work this out economically and without the loss due to cut-and-try experimentation.

It is possible, also, that larger feed pipes may be desirable, or else the use of an additional pump to put a positive pressure on the oil supply tank.

With these mechanical difficulties removed, the method of airplane application of oil for destruction

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(A report on an experimental demonstration conducted by the Alameda County Mosquito Abatement District.)

of mosquito larvae and pupae appears to have usefulness under the following conditions:

1. In oiling areas in early spring, when the dirt roads on and leading to the marshes are so soft that transportation of oil is impossible or very difficult.

2. In oiling large areas at other times of the year which have become flooded at extreme high tides, and where time is not available to cover such large areas on foot.

Under these conditi[illegible] airplane oiling can be made to compare with hand[illegible]ing in both cost and effectiveness.

The limitations of the method are as follows:

1. It is not economical or effective where there are small, isolated breeding places in a marsh, with large areas of nonbreeding ground between.

2. Under the weather conditions which usually prevail on the bay marshes, only a few hours in the early morning can be utilized for flying.

## MORBIDITY*

**Diphtheria.**

26 cases of diphtheria have been reported. Those communities reporting 10 or more cases are as follows: Los Angeles 12.

**Measles.**

54 cases of measles have been reported. Those communities reporting 10 or more cases are as follows: San Francisco 10.

**Scarlet Fever.**

39 cases of scarlet fever have been reported. Those communities reporting 10 or more cases are as follows: Los Angeles 12.

**Whooping Cough.**

345 cases of whooping cough have been reported. Those communities reporting 10 or more cases are as follows: Berkeley 10, Los Angeles County 31, Long Beach 16, Los Angeles 103, Santa Monica 17, San Diego 38.

**Smallpox.**

9 cases of smallpox have been reported, as follows: Los Angeles County 3, Glendale 3, Hawthorne 2, San Joaquin County 1.

**Typhoid Fever.**

10 cases of typhoid fever have been reported, as follows: Fresno 1, Imperial County 1, El Centro 1, Kern County 2, Los Angeles County 1, Napa 1, Fullerton 1, Riverside 1, Sutter County 1.

**Meningitis (Epidemic).**

2 cases of epidemic meningitis have been reported, as follows: Kings County 1, Woodland 1.

**Poliomyelitis.**

6 cases of poliomyelitis have been reported, as follows: Berkeley 2, Oakland 1, Chico 1, Kern County 1, Pomona 1.

**Encephalitis (Epidemic).**

3 cases of epidemic encephalitis have been reported, as follows: Hayward 1, Chico 1, Kern County 1.

**Undulant Fever.**

3 cases of undulant fever have been reported, as follows: Los Angeles County 2, Santa Maria 1.

**Septic Sore Throat.**

2 cases of septic sore throat have been reported, as follows: Bakersfield 1, Riverside 1.

## A STANFORD NURSE IN ARIZONA

Katherine E. Tasker, public health nurse, who received her training at Stanford University School of Nursing, went to a small community in Arizona last year. Outside of her regular hours of employment she started three baby clinics which have grown into a remarkably successful undertaking. Most of this work is among the Navajo Indians, but it also embraces the maintenance of a community educational and recreational center.

A total of 394 children and 267 mothers have attended conferences and 347 individual children and 300 individual parents have been visited in camps. Standard procedures in child hygiene have been adopted. The development of this successful piece of work may be credited entirely to the vision and intelligence of a Stanford nurse who saw an opportunity to serve a community and individually provided the beginning of a service which has grown into a recognized community activity.

Modern medicine is becoming increasingly physiological and decreasingly pathological.—Sir Arthur Newsholme.

To support and help others on occasion is every one's whim. It is the chief end of the doctor's existence.—Marx.

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* From reports received on August 1st and 2d, for week ending July 30th.

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